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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/520,856	01/10/2005	Yasuhiro Sakamoto	62,667 (49321)	2660
21874 7590 02/02/2007 EDWARDS & ANGELL, LLP P.O. BOX 55874 BOSTON, MA 02205			EXAMINER ZIMMERMANN, JOHN P	
			ART UNIT 2809	PAPER NUMBER
			MAIL DATE 02/02/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/520,856

Applicant(s)

SAKAMOTO ET AL.

Examiner

John P. Zimmermann

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 April 2006.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) 8-10 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 1-10 are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 January 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 10 January 2005.
- ☒ Interview Summary (PTO-413)
Paper No(s)/Mail Date. 19 December 2006.
- ☐ Notice of Informal Patent Application
- ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Restriction is required under 35 U.S.C. 121 and 372.

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1.

In accordance with 37 CFR 1.499, applicant is required, in reply to this action, to elect a single invention to which the claims must be restricted.

Group I, claim(s) 1-7, drawn to INK JET/Cartridge.

Group II, claim(s) 8-10, drawn to CUTTING BY USE OF ROTATING AXIALLY MOVING TOOL/PROCESSES.

2. The inventions listed as Groups I & II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

The special technical feature of Group I is an ink jet head comprising a plurality of ink chambers, walls separating ink chambers, driving electrodes, and electrodes which are composed of a conductive material filling each of the ink chambers, for external connection of driving electrodes to an external circuit, which is not shared with Group II.

The special technical feature of Group II is a method of manufacturing an ink jet head comprising the steps of forming a plurality of ink chambers at specific intervals, and forming driving electrodes, and filling electrically conductive material in each ink chamber, and curing electrically conductive material, and bonding piezoelectric material wafer and a cover wafer, and dividing the bonded piezoelectric material wafer and a cover wafer, which is not shared with Group I.

3. During a telephone conversation with Applicant's Representative, David A. Tucker, on 16 January 2007 a provisional election was made with traverse to prosecute the invention of Group I, **claims 1-7**. Affirmation of this election must be made by applicant in replying to this

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Office action. **Claims 8-10** withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

4. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Priority

5. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Drawings

6. Figures 13, 15 & 16A-16C should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

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7. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: "Portion, 21" [Spec. Page 17, Paragraph 1] "...shown in Figure 2". Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application.

Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

8. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: 2A, 2B, 2C, 6A, 6B, 6C, 7A, 7B, & 7C. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

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9. In addition to Replacement Sheets containing the corrected drawing figure(s), applicant is required to submit a marked-up copy of each Replacement Sheet including annotations indicating the changes made to the previous version. The marked-up copy must be clearly labeled as "Annotated Sheets" and must be presented in the amendment or remarks section that explains the change(s) to the drawings. See 37 CFR 1.121(d)(1). Failure to timely submit the proposed drawing and marked-up copy will result in the abandonment of the application.

Specification

10. Since Applicant elected **claims 1-7**, the title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: "Ink Jet Head with Formed External Circuit Connecting Electrodes."

Claim Objections

11. **Claim 4** is objected to because of the following informalities: Repeated Phrase "filled in." Appropriate correction is required.

Claim Rejections - 35 USC § 102

12. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

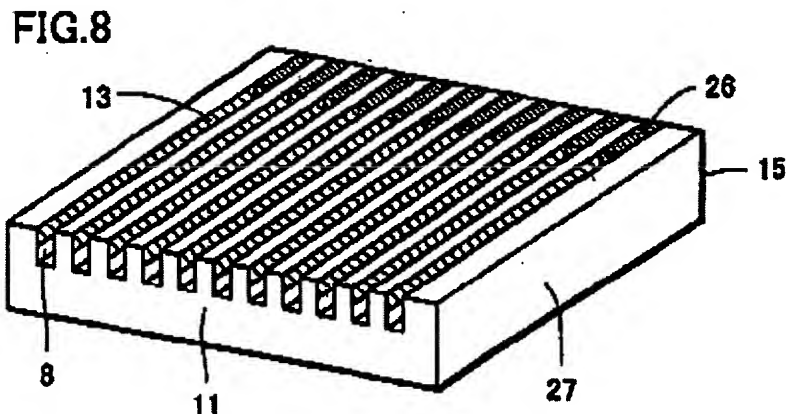
A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

13. **Claims 1, 3 & 5** are rejected under 35 U.S.C. 102(e) as being anticipated by **Higuchi et al.** (US 6,802,596 B2).

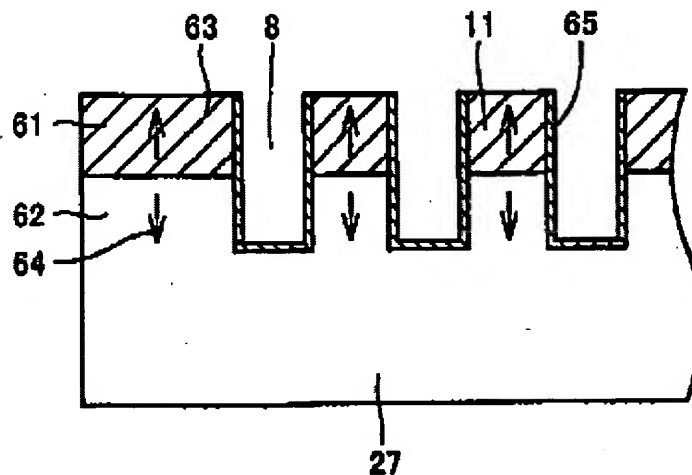
The applied reference has a common Assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

a. As related to independent **claim 1**, Higuchi et al. teach an ink jet head with a plurality of trenches parallel to each other with drive electrodes formed on the side plane of the trenches and a conductive member formed in the vicinity of an end portion of piezoelectric plate (Higuchi et al. – Specification, Column 15, Lines 30-50; Column 17, Lines 37-38 and Figure 8, shown below).

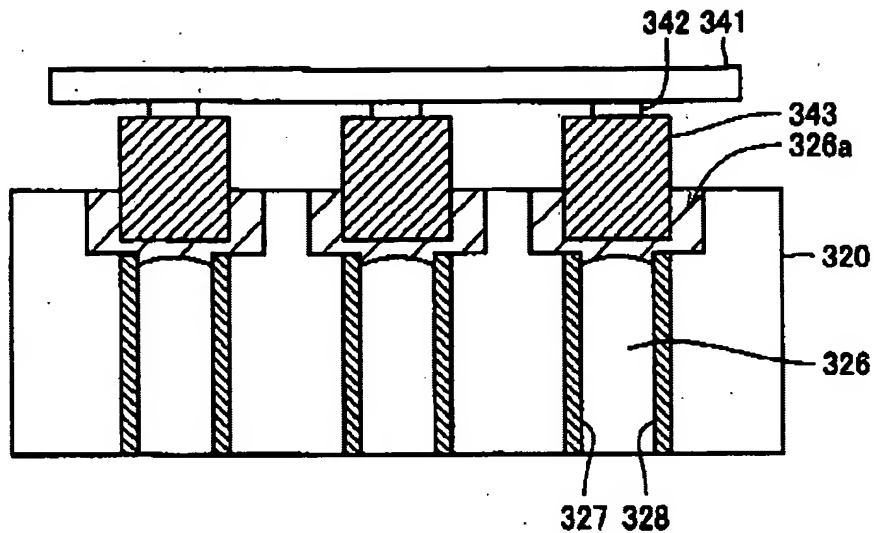
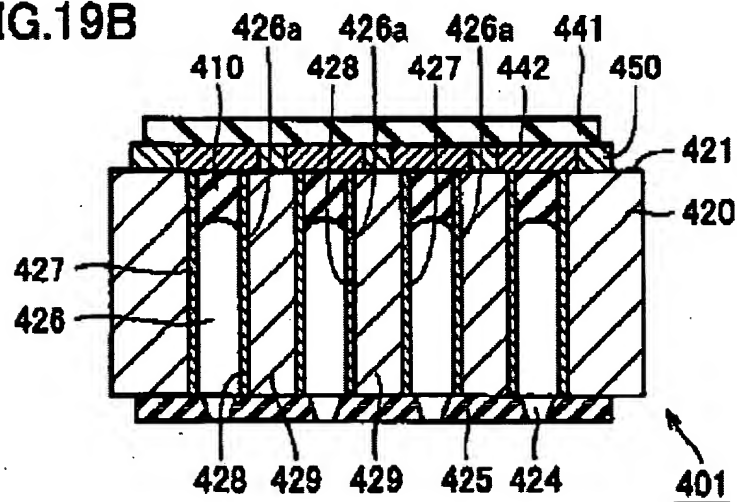


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Additionally, Higuchi et al. teach a piezoelectric plate having an integral structure with electrode being formed all over the trench and a conductive resin including a conductive filler provided at the back side portions of the plurality of ink chambers further being exposed at the back side of in chamber (Higuchi et al. – Specification, Column 18, Lines 58-60, Column 19, Lines 1-12, Figure 11, shown below and Figure 8, shown previously).

FIG.11

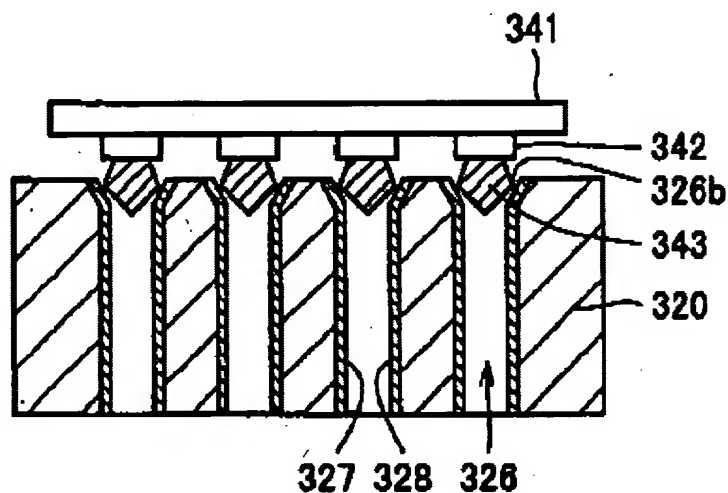
Additionally, Higuchi et al. teach forming at least some of projection electrodes wider than the width of ink chamber in the direction orthogonal to the ink discharge direction, ensuring the electrical connection between electrodes located in ink chamber and projection electrode (Higuchi et al. – Specification, Column 25, Lines 12-16 and Figures 15 & 19B, shown below).

FIG.15**FIG.19B**

- b. As related to dependent **claim 3**, Higuchi et al. teach a conductive resin including a conductive filler provided at the back side portions of the plurality of ink chambers further being exposed at the back side of in chamber (Higuchi et al. – Specification, Column 19, Lines 5-12) and forming at least some of projection electrodes wider than the

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width of ink chamber in the direction orthogonal to the ink discharge direction, ensuring the electrical connection between electrodes located in ink chamber and projection electrode (Higuchi et al. – Specification, Column 25, Lines 12-16 and Figure 16, shown below).

FIG. 16

c. As related to dependent **claim 5**, Higuchi et al. teach a plurality of trenches parallel to each other having the same depth of approximately 300um and a width of approximately 70um (Higuchi et al. – Specification, Column 17, Lines 25-30) and the conductive member filling substantially the entire depth of the trench (Higuchi et al. – Specification, Column 17, Lines 33-34) for an exposed surface region of approximately 21000um^2 being greater than 3960um^2 .

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

15. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

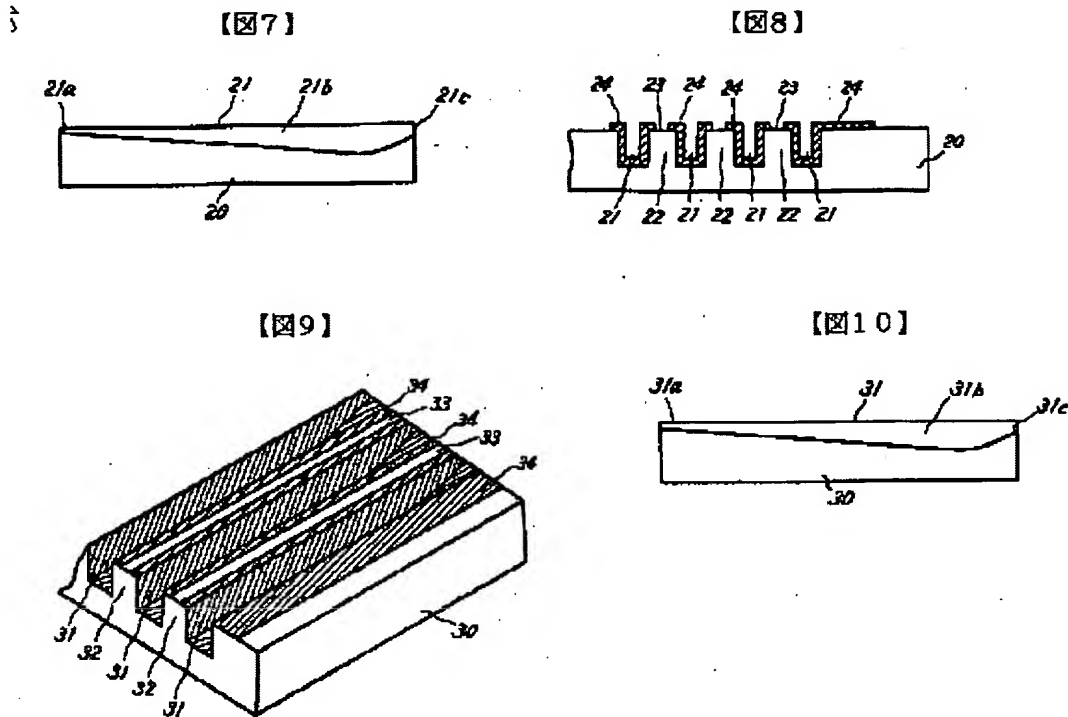
1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

16. **Claim 2** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Higuchi et al.**, (US 6,802,596 B2) as applied to **claim 1** above, and further in view of **Narita et al.**, (JP 05092561 A).

Higuchi et al. teach the limitations of **claim 1** for the reasons above. Higuchi et al. **do not** teach a partially deepened deep groove portions formed in said ink chambers at said rear end portion of the head. **However**, Narita et al. teach a front portion being shallow, a mid portion being deep and back end section is further open (Narita et al. – Machine

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translation, Example, Paragraphs 11-12 & Figures 7 – 10 shown below).



Given the same field of endeavor, specifically a type of inkjet head, it is apparent that one of ordinary skill in the art at the time the invention was made would have been motivated to combine the inkjet head with the wider width of the chamber at the rear as taught by Higuchi et al. with a partially deepened deep groove portions formed in the ink chambers at the rear end portion of the head as taught by Narita et al., in an effort to ensure the electrical connection between electrodes located in the ink chamber and the projection electrode. (Higuchi et al. – Column 25, Lines 12-16). Given that Narita et al. is a foreign language document, a full translation may be provided in the next Office Action.

17. **Claim 4** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Higuchi et al.**, (US 6,802,596 B2) as applied to **claim 1** above, and further in view of **Sagara**, (US 2005/0068374 A1).

Higuchi et al. teach the limitations of **claim 1** for the reasons above. Higuchi et al. *do not* teach formation of electrodes on said exposed surface regions of the electrically conductive material. *However*, Sagara teaches the conductive resin filling a space within each ink chamber constitutes an electrode for external connection (Abstract).

Given the same field of endeavor, specifically a type of inkjet head, it is apparent that one of ordinary skill in the art at the time the invention was made would have been motivated to combine a conductive resin including a conductive filler provided at the back side portions of the plurality of ink chambers further being exposed at the back side of ink chamber as taught by Higuchi et al. with use of conductive resin as an electrode for external connection as taught by Sagara, in an effort to decrease the capacitance due to the piezoelectric substrate (Sagara – Abstract).

18. **Claims 6 & 7** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Higuchi et al.**, (US 6,802,596 B2) in view of **Sagara**, (US 2005/0068374 A1).

a. As related to independent **claim 6**, Higuchi et al. teach an ink jet head with a plurality of trenches parallel to each other with drive electrodes formed on the side plane of the trenches and a conductive member formed in the vicinity of an end portion of piezoelectric plate (Higuchi et al. – Specification, Column 15, Lines 30-50; Column 17, Lines 37-38 and Figure 8, shown previously). Additionally, Higuchi et al. teach a piezoelectric plate having an integral structure with electrode being formed all over the trench and a conductive resin including a conductive filler provided at the back side portions of the plurality of ink chambers further being exposed at the back side of ink chamber (Higuchi et al. – Specification, Column 18, Lines 58-60, Column 19, Lines 1-12

and Figure 11, shown previously). Additionally, Higuchi et al. teach forming at least some of projection electrodes wider than the width of ink chamber in the direction orthogonal to the ink discharge direction, ensuring the electrical connection between electrodes located in ink chamber and projection electrode (Higuchi et al. – Specification, Column 25, Lines 12-16 and Figures 15 & 19B, shown previously). Additionally, Higuchi et al. teach the external electrode of the external drive circuit only has to be connected to the end plane of one of the inside electrodes using *at least one* ACA (Anisotropic Conductive Adhesive) conductor particle in the connection of the external electrode (Higuchi et al. – Specification, Column 12, Lines 5-8). Higuchi et al. *do not* teach formation of electrodes on said exposed surface regions of the electrically conductive material. **However**, Sagara teaches the conductive resin filling a space within each ink chamber constitutes an electrode for external connection (Abstract).

b. As related to dependent **claim 7**, Higuchi et al. teach the area of each connecting part connected to external circuit larger than the area of external circuit connecting electrodes (Higuchi et al. – Figures 19A & 19C shown below & 19B shown previously).

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FIG.19A

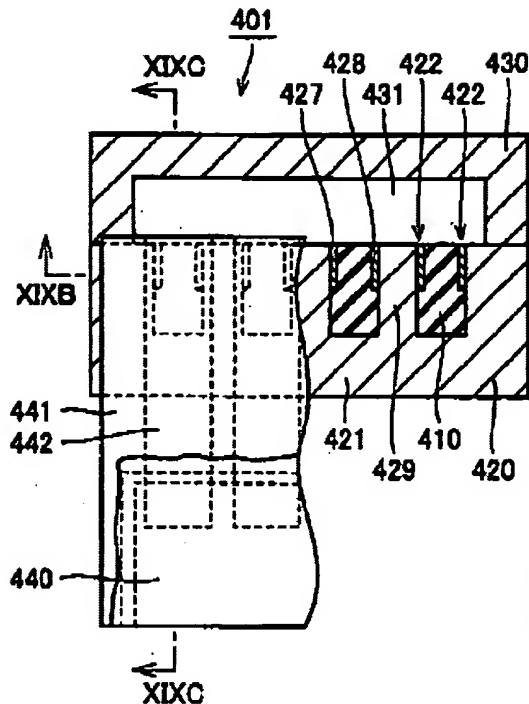
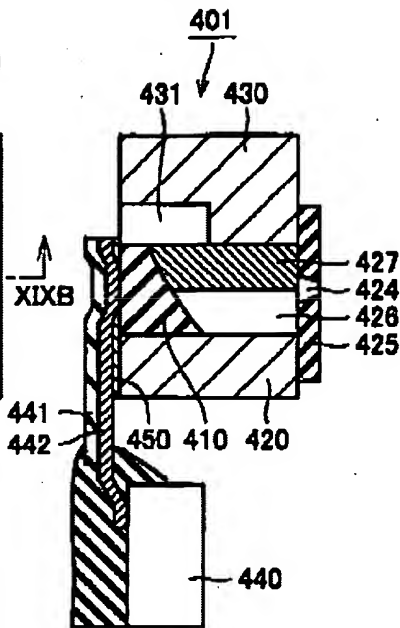


FIG.19C



Given the same field of endeavor, specifically a type of inkjet head, it is apparent that one of ordinary skill in the art at the time the invention was made would have been motivated to combine a conductive resin including a conductive filler provided at the back side portions of the plurality of ink chambers further being exposed at the back side of ink chamber as taught by Higuchi et al. with use of conductive resin as an electrode for external connection as taught by Sagara, in an effort to decrease the capacitance due to the piezoelectric substrate (Sagara – Abstract).

Conclusion

19. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Abe et al. (US 5,825,383A) teach an ink jet head with electrodes and ink chambers. Abe et al. (US 5,988,799 A) teach an ink-jet head with multiple ink chambers. Tanikawa et al.

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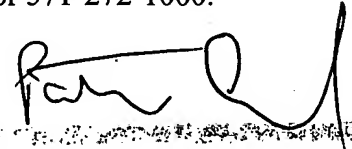
(US 2004/0174414 A1) teach an ink-jet head, with electrodes, and piezoelectric actuator as well as deepened rear portion of ink channel. Salt et al. (US 2005/0179724 A1) teach a print head with connection pads for connecting to a drive circuit. Deguchi et al. (US 7,066,582 B2) teach an ink jet head with a deepened rear portion of ink channel. Isono et al. (US 7,156,503 B2) teach an ink jet head with a plurality of channel grooves and conductive resin arranged at the rear end to fill the inner spaces of the channel grooves and electrically connected to the drive electrode.

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to John P. Zimmermann whose telephone number is 571-272-0233. The examiner can normally be reached on Monday - Thursday, 7:30am - 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Assouad can be reached on 571-272-2210. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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PATRICK ASSOUAD
PRIMARY EXAMINER